

REMARKS

By this amendment, claims 1, 3, 5, 9, 10, 14, 17, 18 and 20-22 are being amended to improve their form; marked up versions of the amended claims are attached hereto pursuant to 37 C.F.R. § 1.121(c)(ii). New claim 23 is being added, to advance the prosecution of the application. Claims 1-23 are pending in the application. No new matter is involved.

In paragraph 2 on page 2 of the Office Action, claims 1-4 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 5,789,763 of Kato et al. In paragraph 4 on page 4 of the Office Action, claims 5-22 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 5,744,824 of Kousai et al. These rejections are respectfully traversed, particularly in view of the claims as amended herein.

The Office Action appears to apply the prior art to the present invention on the basis that, among the plurality of semiconductor elements, other elements aligned in a different direction may be present. However, a feature of the present invention is that by setting the direction of the semiconductor elements for sampling data to be supplied to other semiconductor elements to differ from the side directions of the substrate, variation in the characteristics of semiconductor elements due to variations in the laser output profiles can be prevented. Even when a structure is created in which the alignment of an element is different from the alignment of the other elements because of some design considerations, no motivation for the present invention exists.

The claims have been rejected as obvious in view of the newly cited Kato and Kousai references. However, a review of such references shows them to be no more relevant to the present invention than the previously cited art. As in the case of the previously cited art, the newly cited art does not disclose nor suggest the setting for a channel width and for a channel width direction in the manner of the invention. The cited art neither describes nor has, nor has a motivation for

prevention or at least an inhibition of, variations in the characteristics of transistors that sample display data (second thin-film transistors), which has significant effects on the display quality caused by energy variation among pulses in a pulse laser, and on an energy distribution in a pulse laser beam during a laser beam scan process.

Claims 1, 3, 5, 9, 10, 14, 17, 18, and 20-22, as amended, and the claims which depend therefrom, are submitted to clearly distinguish patentably over the art. As amended, claim 1 recites "in at least semiconductor elements, among said plurality of semiconductor elements, that samples data to be supplied to other semiconductor elements", a channel width of a channel region formed in a semiconductor layer to which laser annealing is applied is larger than a channel length thereof, and channel width direction is neither vertical to nor parallel with regard to a side direction of said substrate". Claim 3 as amended contains a similar recitation, and in addition, the cites "and a channel width direction is neither vertical nor parallel with regard to at least two different major side directions of said substrate".

Claim 5 as amended, recites "and at least transistors, among said plurality of second thin-film transistors, that sample display data to be supplied to said first-thin film transistors, a channel width of a channel region formed in a semiconductor film to which laser annealing is applied is larger than a channel length thereof, and a channel width direction is neither vertical to nor parallel with regard to a side direction of said substrate." Claims 9, 10, 14, 17, 18 and 20-22 have been amended to contain similar recitations. In addition, claims 18 and 22 contain further recitation "and a channel width is larger than a channel length and a channel width direction differs from the direction of the sides of the substrate and from a channel width direction of the first-thin film transistors in at least the sampling transistors among the second thin-film transistors".

Thus, claims 1-22 recite the distinguishing features in accordance with the present invention so as to clearly distinguish patentably over the art.

New claim 23 is similar to claim 5 as amended. In addition, claim 23 recites "said channel width direction is formed in a direction different from a major-axis direction and a minor-axis direction of a laser-beam irradiated legion at the time of application of said laser annealing". Therefore, new claim 23 is also submitted to clearly distinguish patentably over the art.

In conclusion, claims 1-22 and new claim 23 are submitted to clearly distinguish patentably over the prior art for the reasons discussed above. Therefore, reconsideration and allowance are respectfully requested.

If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at the Los Angeles telephone number (213) 337-6742 to discuss the steps necessary for placing the application in condition for allowance.

If there are any fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 50-1314.

Respectfully submitted,

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Version with markings to show changes made:

IN THE CLAIMS:

Rewrite claim 1 as follows:

1. (Twice Amended) A semiconductor device in which a plurality of semiconductor elements are formed on a substrate, wherein
in [some or all of said] at least semiconductor elements, among said plurality of semiconductor elements, that samples data to be supplied to other semiconductor elements, a channel width of a channel region formed in a semiconductor layer to which laser annealing is applied is larger than a channel length thereof, and a channel width direction is neither vertical to nor parallel with regard to a side direction of said substrate.

Rewrite claim 3 as follows:

3. (Twice Amended) A semiconductor device in which a plurality of semiconductor elements are formed on a substrate, wherein
in [some or all of said] at least semiconductor elements, among said plurality of semiconductor elements, that samples data to be supplied to other semiconductor elements, a channel width of a channel region formed in a semiconductor layer to which laser annealing is applied is larger than a channel length thereof, [and] a channel width direction is formed in a direction different from a major-axis direction and a minor-axis direction of a laser-beam irradiated region at the time of application of said laser annealing[.], and a channel width direction is neither vertical nor parallel with regard to at least two different major side directions of said substrate.

Rewrite claim 5 as follows:

5. (Twice Amended) A display device, comprising:
a plurality of pixel electrodes arranged on a substrate;

a plurality of first thin-film transistors connected to corresponding pixel electrodes among said plurality of pixel electrodes for supplying signals for operating pixels to the connected pixel electrodes; and

a plurality of second thin-film transistors constituting a scanning drive circuit for scanning said plurality of first thin-film transistors and/or a display drive circuit for supplying display signals to said plurality of first thin-film transistors, wherein

in [some or all of said plurality of second thin-film] at least transistors, among said plurality of second thin-film transistors, that sample display data to be supplied to said first thin-film transistors, a channel width of a channel region formed in a semiconductor film to which laser annealing is applied is larger than a channel length thereof, [and] a channel width direction is neither vertical to nor parallel with regard to a side direction of said substrate.

Rewrite claim 9 as follows:

9. (Twice Amended) A display device, comprising:
- a plurality of pixel electrodes arranged on a substrate;
 - a plurality of first thin-film transistors connected to corresponding pixel electrodes among said plurality of pixel electrodes for supplying signals for operating pixels to the connected pixel electrodes; and
 - a plurality of second thin-film transistors constituting a scanning drive circuit for scanning said plurality of first thin-film transistors and/or a display drive circuit for supplying display signals to said plurality of first thin-film transistors, wherein
- in [some or all of said plurality of second thin-film] at least transistors, among said plurality of second thin-film transistors, that sample display data to be supplied to said first-thin film transistors, a channel width of a channel region formed in a semiconductor film to which laser annealing is applied is larger than a channel length thereof, and a channel width direction is formed in a direction different from a side direction of said substrate, and

said channel width direction of said some or all of second thin-film transistors is set to a direction of about 45° relative to any one or all of a plurality of side directions of said substrate.

Rewrite claim 10 as follows:

10. (Twice Amended) A display device, comprising:
a plurality of pixel electrodes arranged on a substrate;
a plurality of first thin-film transistors connected to corresponding pixel electrodes among said plurality of pixel electrodes for supplying signals for operating pixels to the connected pixel electrodes; and
a plurality of second thin-film transistors constituting a scanning drive circuit for scanning said plurality of first thin-film transistors and/or a display drive circuit for supplying display signals to said plurality of first thin-film transistors, wherein

in [some or all of said plurality of second thin-film] at least transistors, among said plurality of second thin-film transistors, that sample display data to be supplied to said first-thin film transistors, a channel width of a channel region formed in a semiconductor film to which laser annealing is applied is larger than a channel length thereof, and a channel width direction is formed in a direction different from a major-axis direction and a minor-axis direction of a laser-beam irradiated region at the time of application of said laser annealing.

Rewrite claim 14 as follows:

14. (Twice Amended) A display device, comprising:
a plurality of pixel electrodes arranged on a substrate;
a plurality of first thin-film transistors connected to corresponding pixel electrodes among said plurality of pixel electrodes for supplying signals for operating pixels to the connected pixel electrodes; and
a plurality of second thin-film transistors constituting a scanning drive circuit for scanning said plurality of first thin-film transistors and/or a display drive

circuit for supplying display signals to said plurality of first thin-film transistors, wherein

in [some or all of said plurality of second thin-film] at least transistors, among said plurality of second thin-film transistors, that sample display data to be supplied to said first-thin transistors, a channel width of a channel region formed in a semiconductor film to which laser annealing is applied is larger than a channel length thereof, and a channel width direction is formed in a direction different from a major-axis direction and/or a minor-axis direction of a laser-beam irradiated region at the time of application of said laser annealing, and

said channel width direction of said some or all of second thin-film transistors is set to a direction of about 45° relative to the major-axis direction and/or the minor-axis direction of said laser-beam irradiated region.

Rewrite claim 17 as follows:

17. (Twice Amended) A liquid crystal display device, comprising:
- a plurality of pixel electrodes arranged on one of a pair of substrates holding a liquid crystal therebetween;
 - a plurality of first thin-film transistors connected to corresponding pixel electrodes among said plurality of pixel electrodes for supplying signals for operating the liquid crystal to the connected pixel electrodes; and
 - a plurality of second thin-film transistors constituting a scanning drive circuit for scanning said plurality of first thin-film transistors and/or a display drive circuit for supplying display signals to said plurality of first thin-film transistors, channel regions of said plurality of first and second thin-film transistors being formed in a semiconductor film to which laser annealing is applied, and
 - in [some or all of said plurality of second thin-film] at least transistors, among said plurality of second thin-film transistors, that sample display data to be supplied to said first thin-film transistors, a channel width being larger than a channel length, and a channel width direction of some or all of second thin-film

transistors being formed non-parallel with and non-orthogonal to a channel width direction of said first thin-film transistors,

wherein

among said plurality of second thin-film transistors, said some or all of second thin-film transistors in which the channel width direction is formed non-parallel with and non-orthogonal to the channel width direction of said first thin-film transistors

are used, in said display drive circuit, as sampling transistors for sampling video signals at a predetermined timing and supplying said display signals to the corresponding plurality of first thin-film transistors.

Rewrite claim 18 as follows:

18. (Twice Amended) A liquid crystal display device, comprising:
a plurality of pixel electrodes arranged on one of a pair of substrates holding a liquid crystal therebetween;

a plurality of first thin-film transistors connected to corresponding pixel electrodes among said plurality of pixel electrodes for supplying signals for operating the liquid crystal to the connected pixel electrodes; and

a plurality of second thin-film transistors constituting a scanning drive circuit for scanning said plurality of first thin-film transistors and/or a display drive circuit for supplying display signals to said plurality of first thin-film transistors,

channel regions of said plurality of first and second thin-film transistors being formed in a semiconductor film to which laser annealing is applied, and

in [some or all of said plurality of second thin-film] at least transistors, among said plurality of second thin-film transistors, that sample display data to be supplied to said first-thin film transistors, a channel width being larger than a channel length, [and] a channel width direction of some or all of second thin-film transistors being formed non-parallel with and non-orthogonal to a channel width direction of said first thin-film transistors, and a channel width is larger than a

channel length and a channel width direction differs from the direction of the sides of the substrate and from a channel width direction of the first-thin film transistors in at least the sampling transistors among the second thin-film transistors,

wherein

said display drive circuit comprises:

a video signal line to which the video signals are supplied from outside, sampling transistors for sampling the video signals from said video signal line at a predetermined timing and supplying said display signals to the corresponding plurality of first thin-film transistors, and a shift register for controlling switching operation of said sampling transistors,

and wherein, among said plurality of second thin-film transistors, said some or all of second thin-film transistors in which the channel width direction is formed non-parallel with and non-orthogonal to the channel width direction of said first thin-film transistors

are used in said sampling transistors and the shift register.

Rewrite claim 20 as follows:

20. (Twice Amended) A liquid crystal display device, comprising:
a plurality of pixel electrodes arranged on one of a pair of substrates holding a liquid crystal therebetween;

a plurality of first thin-film transistors connected to corresponding pixel electrodes among said plurality of pixel electrodes for supplying signals for operating the liquid crystal to the connected pixel electrodes; and

a plurality of second thin-film transistors constituting a scanning drive circuit for scanning said plurality of first thin-film transistors and/or a display drive circuit for supplying display signals to said plurality of first thin-film transistors,

channel regions of said plurality of first and second thin-film transistors being formed in a semiconductor film to which laser annealing is applied, and

in [some or all of said plurality of second thin-film] at least transistors, among said plurality of second thin-film transistors, that sample display data to be supplied to said thin-film transistors, a channel width being larger than a channel length, and a channel width direction of some or all of second thin-film transistors being formed non-parallel with and non-orthogonal to a channel width direction of said first thin-film transistors,

wherein

said channel width direction of the channel region of said some or all of second thin-film transistors is set to a direction of about 45° relative to the channel width direction of said first thin-film transistors.

Rewrite claim 21 as follows:

21. (Twice Amended) A display device, comprising:

a plurality of pixel electrodes arranged on a substrate;

a plurality of first thin-film transistors connected to corresponding pixel electrodes among said plurality of pixel electrodes for supplying signals for operating pixels to the connected pixel electrodes; and

a plurality of second thin-film transistors constituting a scanning drive circuit for scanning said plurality of first thin-film transistors and/or a display drive circuit for supplying display signals to said plurality of first thin-film transistors, wherein

in [some or all of said plurality of second thin-film] at least transistors, among said plurality of second thin-film transistors, that sample display data to be supplied to said first thin-film transistors, a channel width of a channel region formed in a semiconductor film to which laser annealing is applied is larger than a channel length thereof, and a channel width direction is formed in a direction different from a major-axis direction and/or a minor-axis direction of a laser-beam irradiated region at the time of application of said laser annealing, and

the channel width of some or all of said plurality of second thin-film transistors is formed neither parallel with nor orthogonal to a channel width direction of said plurality of first thin-film transistors.

Rewrite claim 22 as follows:

22. (Twice Amended) A display device, comprising:

a plurality of pixel electrodes arranged on a substrate;

a plurality of first thin-film transistors connected to corresponding pixel electrodes among said plurality of pixel electrodes for supplying signals for operating pixels to the connected pixel electrodes; and

a plurality of second thin-film transistors constituting a scanning drive circuit for scanning said plurality of first thin-film transistors and/or a display drive circuit for supplying display signals to said plurality of first thin-film transistors, wherein

in [some or all of said plurality of second thin-film] at least transistors, among said plurality of second thin-film transistors, that sample display data to be supplied to said first-thin film transistors, a channel width of a channel region formed in a semiconductor film to which laser annealing is applied is larger than a channel length thereof, [and] a channel width direction is formed in a direction different from a major-axis direction and/or a minor-axis direction of a laser-beam irradiated region at the time of application of said laser annealing, and a channel width is larger than a channel length and a channel width direction differs from the direction of the size of the substrate and from a channel width direction of the first-thin film transistors than at least the sampling transistors among the second thin-film transistors.

the channel width of some or all of said plurality of second thin-film transistors is formed neither parallel with nor orthogonal to a channel width direction of said plurality of first thin-film transistors, and

said display drive circuit comprises:

a video signal line to which the video signals are supplied from outside, sampling transistors for sampling the video signals from said video signal line at a predetermined timing and supplying said display signals to the corresponding plurality of first thin-film transistors, and a shift register for controlling switching operation of said sampling transistors,

and wherein, among said plurality of second thin-film transistors, said some or all of second thin-film transistors in which the channel width is larger than the channel length and the channel width direction is formed in a direction different from the major-axis direction and/or the minor-axis direction of said laser beam irradiated region are used in said sampling transistors and the shift register.